WHAT IS CLAIMED IS:

1. A system for operating a power amplifier in a mobile handset, comprising:

a carrier amplifier having a carrier input terminal and a carrier output terminal;

a peak amplifier having a peak input terminal, a peak output terminal and a control terminal for receiving a voltage control signal, the peak amplifier configured to vary at least one characteristic of the power amplifier based upon the voltage control signal;

an active phase shifter, coupled to the carrier input terminal and the peak input terminal, for generating a peak amplifier input signal delayed in phase from a carrier amplifier input signal; and

an output matching unit, coupled to the carrier output terminal and the peak output terminal, for transmitting a carrier output power signal and a peak output power signal and forming a power amplifier output power signal at a power amplifier output stage.

2. The system of claim 1, wherein the active phase shifter further comprises:

a lower differential unit, coupled to an input stage and the peak input terminal, for generating the peak amplifier input signal;

an upper differential unit, coupled to the input stage and the carrier input terminal, for generating the carrier amplifier input signal; and

a phase control unit, coupled to the input stage and the upper differential unit, for tuning a phase difference between the peak amplifier input signal and the carrier amplifier input signal within a phase tolerance.

3. The system of claim 2, wherein the lower differential unit comprises a first active component.

4. The system of claim 3, wherein the first active component is a common-emitter bipolar transistor.

5. The system of claim 3, wherein the first active component is a common-source field effect transistor.

6. The system of claim 2, wherein the upper differential unit comprises a second active component.

7. The system of claim 6, wherein the second active component is a common-base bipolar transistor.

8. The system of claim 6, wherein the second active component is a common-gate field effect transistor.

9. The system of claim 2, wherein the phase control unit is an Inductor-Capacitor (LC) circuit.

10. The system of claim 1, wherein the active phase shifter, the carrier amplifier, the peak amplifier, and the output matching unit are integrated on a semiconductor die.

11. The system of claim 1, wherein the active phase shifter is realized on a first semiconductor die, and the carrier amplifier, the peak amplifier, and the output matching unit are integrated on a second semiconductor die.

12. The system of claim 2, wherein the phase control unit is realized on a first semiconductor die, and the upper differential unit, the lower differential unit, the peak amplifier, the carrier amplifier, and the output matching unit are integrated on a second semiconductor die.

13. The system of claim 1, wherein the output matching unit further comprises:

a first transformer having a first input coupled to the carrier output terminal and a first output coupled to the peak output terminal; and

a second transformer having a second input coupled to the output of the first transformer and a second output coupled to the power amplifier output stage.

14. The system of claim 1, wherein the output matching unit is implemented with lumped elements.

15. The system of claim 1, wherein the at least one characteristic of the power amplifier is linearity.

16. The system of claim 1, further comprising a baseband modem chipset for receiving signals transmitted by a remote base station and generating the voltage control signal in a first voltage state if power levels of the received signals indicate that the power amplifier operates within a low power range and generating the voltage control signal in a second voltage state if the power levels of the received signals indicate that the power amplifier operates within a high power range.

17. The system of claim 16, wherein the low power range and the high power range are separated by an output power threshold of 10-19 dBm.

18. The system of claim 16, wherein the peak amplifier further comprises a voltage control unit configured to receive the voltage control signal and control a bias current of the peak amplifier such that the power amplifier is operated as a Doherty-type amplifier when the voltage control signal is in the first voltage state and the peak amplifier is operated as a class AB amplifier when the voltage control signal is in the second voltage state.

19. The system of claim 1, wherein the peak amplifier input signal is shifted in phase from the carrier amplifier input signal by approximately 90 degrees.

20. The system of claim 2, wherein the phase tolerance is 5%.

21. A method for providing phase control in a Doherty communication amplifier, the Doherty communication amplifier including a carrier amplifier and a peak amplifier, comprising:

processing an input signal via an active phase shifter to generate a differential output, the differential output further comprising a first differential output signal and a second differential output signal, the first differential output signal and the second differential output signal having a phase difference; and

tuning the phase difference to within a phase tolerance based upon input signal characteristics.

22. The method of claim 21, wherein the phase difference is approximately 90 degrees.

23. The method of claim 21, wherein the phase tolerance is 5%.

24. The method of claim 21, wherein the input signal characteristics include input signal frequency and input signal power.

25. The method of claim 21, wherein tuning further comprises tuning the phase difference by electrically coupling circuit elements to the Doherty communication amplifier.

26. The method of claim 21, wherein tuning further comprises tuning the phase difference by varying a capacitive value of a phase control unit capacitor via laser trimming of the phase control unit capacitor.

27. The method of claim 21, wherein tuning further comprises tuning the phase difference by varying a capacitive value of a phase control unit varactor.

28. The method of claim 21, further comprising:

receiving signals transmitted by a remote base station;

generating a voltage control signal based upon power levels of the signals transmitted by the remote base station; and

biasing the peak amplifier via the voltage control signal.

29. The method of claim 28, wherein the generating further comprises generating the voltage control signal in a first state if the power levels of the signals transmitted by the remote base station indicate that the Doherty communication amplifier operates in a low output power range.

30. The method of claim 29, wherein the voltage control signal in the first state biases the peak amplifier as a class B or a class C amplifier.

31. The method of claim 28, wherein the generating further comprises generating the voltage control signal in a second state if the power levels of the signals transmitted by the remote base station indicate that the Doherty communication amplifier operates in a high output power range.

32. The method of claim 31, wherein the voltage control signal in the second state biases the peak amplifier as a class AB amplifier.

33. A system for providing phase control in a Doherty communication amplifier, the Doherty communication amplifier including a carrier amplifier and a peak amplifier, comprising:

means for processing an input signal via an active phase shifter to generate a differential output, the differential output further comprising a first differential output signal and a second differential output signal, the first differential output signal and the second differential output signal having a phase difference; and

means for tuning the phase difference to within a phase tolerance based upon input signal characteristics.

34. The system of claim 33, wherein means for tuning further comprises means for electrically coupling circuit elements to the Doherty communication amplifier.

35. The system of claim 33, further comprising

means for receiving signals transmitted by a remote base station;

means for generating a voltage control signal based upon power levels of the signals transmitted by the remote base station; and

means for biasing the peak amplifier via the voltage control signal.

36. The system of claim 35, wherein means for biasing further comprises means for biasing the peak amplifier as a class B or a class C amplifier.

37. The system of claim 35, wherein means for biasing further comprises means for biasing the peak amplifier as a class AB amplifier.